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(54) Casing for plug and cable

(57) A device is intended to be provided on a plug (2) of the type having a first end (2a) and a second end (2b). A cable (3) comprising at least one conductor (4) in a cable sheathing (5) is inserted in the first end (2a), leaving a gap between the plug (2) and the cable sheathing (5). The second end (2b) is to be inserted in a socket in a housing (6) of an electrical appliance, such as an electrical actuator, for establishing an electrical connection between the appliance and the cable conductors. The device is characterised by a casing (1) comprising two shells (1a, 1b) with means (11a, 11b) for tightly locking the shells together along their longitudinal edges. The casing has an interior form adapted to form-fittingly receive the first end (2a) of the plug (2) and a part of the cable including the adjacent cable sheathing (5), with an opening (7) at each end of the casing (1), such that the cable (5) is protruding from one end of the casing and the second end (2b) of the plug is protruding from the other end of the casing, when the plug is enclosed in the casing. The casing further has locking means (13, 14) for permanently mechanically connect the casing and the enclosed plug to the housing (6).

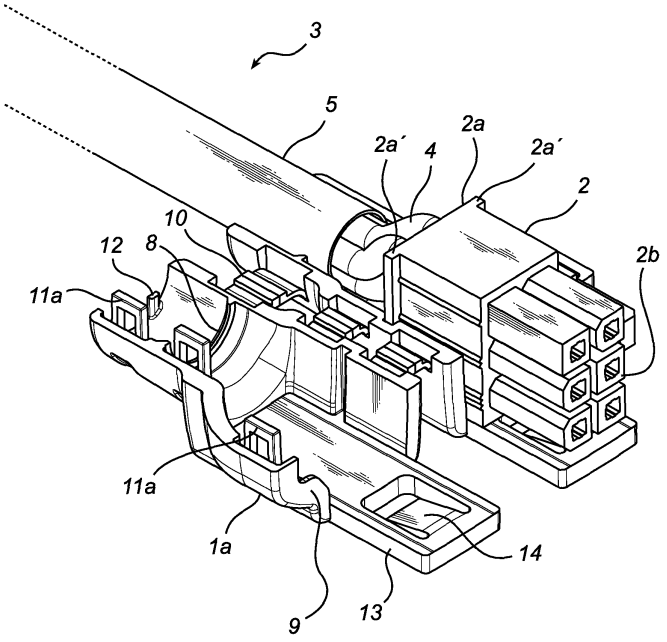

Fig. 4

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Description

Field of the invention

[0001] The present invention relates to a device intended to be provided on a plug of the type having a first end and a second end, wherein a cable comprising at least one conductor in a cable sheathing is inserted in the first end, leaving a gap between the plug and the cable sheathing, and wherein the second end of the plug is to be inserted in a socket in a housing of an electrical appliance, such as an electrical actuator, for establishing an electrical connection between the appliance and the cable conductors.

Background of the invention

[0002] Various electrical appliances, such as for example actuators and valves, are often produced by one manufacturer and sold to other equipment manufacturers, so-called OEM:s, who incorporate them in cabinets of various electrical control equipment. As the electrical connection is generally done at the OEM, cables which are permanently connected to the electrical appliances cannot be used.

[0003] Fig. 1 shows a housing containing an electrical actuator. When this capsulated actuator in its housing is mounted in a cabinet, which is sealed and to which the end user has no access, a detachable electrical connector of the type shown in Fig. 1 is used. This connector consists of a plug 2, in which a cable 3 is inserted and where there is a gap between the plug 2 and a cable sheathing 5.

[0004] When the actuator in its housing is mounted in a cabinet, which is not sealed and to which the end user has access, a different and safer electrical connector is required. These connectors are much more expensive than the plug described above, as they have to prevent even very small objects to reach live parts. Hence, an OEM does not use this type of connector unless required. The actuator casing itself though has a suffient degree of protection.

[0005] Occasionally an OEM discovers, after assembly and connecting, that a cabinet is not answering to the demanded degree of protection. The electrical connectors will then have to be replaced or overmolded, which in both cases is costly and takes time.

[0006] Hence, there is a need of a less expensive plug device which makes it possible, after connecting in a cabinet, to increase the degree of protection and provide a permanent electrical connection in a rapid yet reliable way.

Summary of the invention

[0007] An object of the present invention is to provide a device for a plug of the above mentioned type which device solves the above-mentioned problem. This object is achieved by means of a device intended to be provided on a plug of the type having a first end and a second end, wherein a cable comprising at least one conductor in a cable sheathing is inserted in the first end, leaving a gap between the plug and the cable sheathing, and wherein the second end is to be inserted in a socket in a housing of an electrical appliance, such as an electrical actuator, for establishing an electrical connection between the appliance and the cable conductors, which device is characterised by a casing comprising two shells with means for tightly locking the shells together along their longitudinal edges, wherein the casing has an interior form adapted to form-fittingly receive the first end of the plug and a part of the cable including the adjacent cable sheathing, with an opening at each end of the casing, such that the cable is protruding from one end of the casing and the second end of the plug is protruding from the other end of the casing, when the plug is enclosed in the casing, and wherein the casing has locking means for permanently mechanically connect the casing and the enclosed plug to the housing .

[0008] At the opening for the plug the casing preferably has two extensions arranged opposite each other and in parallel with the second end of the plug, when the plug is enclosed in the casing, wherein each extension has a locking wedge, which, when the casing and the enclosed plug are inserted in the socket, permanently locks the casing and the enclosed plug in a mating notch inside the housing. Alternative locking means, such as screws or other fastener could be used.

[0009] According to a preferred embodiment and for ease of handling the casing is preferably integrally molded in one piece with film hinges between the shells. The means for locking the shells together preferably comprises a snap connection, although wire clips or snap rings also could be used. This provides for rapid and simple closing of the casing without the need of additional tools.

[0010] Advantageously the casing has means for sealing against and clamping the cable sheathing for providing a strain relief of the conductors.

[0011] The interior form of the casing is further designed to enclose an unlocking handle on the plug for preventing unintentional disconnection.

[0012] The object of the invention is further an electrical connector comprising a plug of the above mentioned typ, which connector is provided with a casing of the above mentioned type.

[0013] Further objects and features of the present invention will be apparent from the description and the claims.

Brief description of the drawings

[0014] The invention will now be described in more detail with reference to the appended drawings in which:

Fig. 1 is a perspective view and shows a housing of an actuator with an inserted plug of the type de-

scribed by way of introduction and part of a cable.

Fig. 2 is the same view as Fig. 1 but showing the plug enclosing a device according the invention.

Fig. 3 is a perspective view and shows the device according the invention out folded.

Fig. 4 is the same view as Fig. 3 but with the plug and part of a cable placed in the device.

Fig. 5 is plan view showing the device according the invention with the plug and part of a cable.

Description of a preferred embodiment

[0015] Below is described a preferred embodiment of the invention.

[0016] In Fig. 2 is shown an actuator housing 6. An electrical connector in form of a plug with a device 1 according the invention is inserted in a socket in the housing 6.

[0017] The plug 2, which is shown more in detail in Fig. 1, 4 and 5, has a first end 2a and a second end 2b. A cable 3 comprising several conductors 4 in a cable sheathing 5 is inserted in the first end 2a, leaving a gap between the plug 2 and the cable sheathing 5. Hence, the conductors 4 are not covered by the cable sheathing in the gap. The second end 2b is to be inserted in the socket in the housing 6 of the electrical actuator, for establishing an electrical connection between the actuator and the cable conductors. The plug further has a resilient unlocking handle 16, which when pressed unlocks the inserted plug from the socket.

[0018] The device 1 according the invention is a casing 1 comprising two shells 1 a, 1 b with snap connection 11a, 11b for tightly locking the shells together along one of their longitudinal edges. The casing 1 is integrally molded in one piece with film hinges 10 between the shells along the other of their longitudinal edges. Each shell covers a longitudinal half of the plug and the cable.

[0019] The interior form of the casing is designed to form-fittingly receive the first end 2a of the plug 2 and the adjacent cable sheathing 5.

[0020] The casing 1 has an opening at each end, wherein the cable 3 is protruding from one end, below called cable end of the casing, and the second end 2b of the plug 2 is protruding from the other end, below called plug end of the casing, when the plug 2 and the associated cable 3 are lying in the casing 1.

[0021] The cable end of the casing is essentially circular in cross section for mating with the cable, and each shell at the cable end has hence the form of a semicircular channel. An inner wall of each semicircular channel is provided with a bead 8. The beads 8 are arranged such that they together form an annular ring which is sealing against the cable sheathing 5 when the plug 2 and the associated cable 3 are present in the casing 1, thus preventing ingress of foreign objects into the interior of the casing. The beads 8 together with the tabs 12, projecting towards the centre of the opening at the outermost cable end, are clamping the cable sheathing 5, thus providing a strain relief for the cable.

[0022] The plug end of the casing is essentially rectangular in cross section for mating with the essentially rectangular first end 2a of the plug. Hence the semicircular channel at the cable end continues in a channel comprising a bottom wall and two side walls arranged essentially right-angled in relation to each other at the plug end. The bottom wall and one side wall are plane, whereas the other side wall is curved in order to accommodate the unlocking handle 16 on the plug 2. This prevents unintentional detaching of the plug as the resilient handle 16 is covered by the casing 1, making it impossible to activate. The curved side wall ends at the free end thereof with a flange 9 directed towards the centre of the plug end opening.

[0023] The plug has at the first end 2a a raised edge 2a' at each long side. The shells have corresponding grooves 15 for receiving the raised edges. Hence with the raised edges inserted in the grooves the plug is prevented from gliding in relation to the casing.

[0024] The casing further has means for making the plug and socket connection a permanent electrical connection. This means comprises two extensions 13 arranged at the opening of the plug end of the casing, opposite each other and in parallel with the second end 2b of the plug 2, when the plug is present in the casing. Each extension 13 has a locking wedge 14. When the casing and the enclosed plug are inserted in the socket the wedges 14 permanently lock the casing and the enclosed plug in a mating notch inside the housing 6. The housing 6 has a socket opening 6' sized to tight-fittingly receive the extensions 13 as well as the second end 2b of the plug.

[0025] With the device according the invention it is simple to, after mounting and connecting, increase the degree of protection without the need of additional tools. The casing is simply enveloped around the plug and part of the cable, snap locked and inserted in a socket. Once locked the casing cannot be opened. The wedges are preventing withdrawal of the casing from the socket. The plug end of the casing is abutting the actuator housing wall and is covering the socket opening.

[0026] With the casing according the invention it is further possible to use a less expensive plug and yet achieve such a high degree of protection that the plug could be used in a non sealed cabinet. This makes it possible for the actuator manufacturer to use the same kind of actuator in different applications with different demands regarding the degree of protection.

[0027] The skilled man realises that although the invention has been described in relation to a specific embodiments, modifications and variations are possible within the scope of the appended claims.

[0028] The interior form of the casing has been described in relation to a specific form of plug. With a different form of the plug the casing will have another but mating form. The plug could be a male connector and the socket a female connector, or vice versa. Other elec-

trical appliances than actuators could be installed in the housing.

Claims

1. Device intended to be provided on a plug (2) of the type having a first end (2a) and a second end (2b), wherein a cable (3) comprising at least one conductor (4) in a cable sheathing (5) is inserted in the first end (2a), leaving a gap between the plug (2) and the cable sheathing (5), and wherein the second end (2b) is to be inserted in a socket in a housing (6) of an electrical appliance, such as an electrical actuator, for establishing an electrical connection between the appliance and the cable conductors,
characterised by a casing (1) comprising two shells (1 a, 1 b) with means (11a, 11b) for tightly locking the shells together along their longitudinal edges,
wherein the casing has an interior form adapted to form-fittingly receive the first end (2a) of the plug (2) and a part of the cable including the adjacent cable sheathing (5), with an opening at each end of the casing (1), such that the cable (5) is protruding from one end of the casing and the second end (2b) of the plug is protruding from the other end of the casing, when the plug is enclosed in the casing, and
wherein the casing has locking means (13, 14) for permanently mechanically connect the casing and the enclosed plug to the housing (6).

2. Device according to claim 1, wherein the casing at the opening for the plug (2) has two extensions (13) arranged opposite each other and in parallel with the second end of the plug, when the plug is enclosed in the casing, wherein each extension has a locking wedge (14), which, when the casing and the enclosed plug are inserted in the socket, permanently locks the casing and the enclosed plug in a mating notch inside the housing (6).

3. Device according to claim 1 or 2, wherein the casing is integrally molded in one piece with film hinges (10) between the shells (1 a, 1 b).

4. Device according to any of claim 1-3, wherein the means for locking the shells together comprises a snap connection (11a, 11b).

5. Device according to any of claim 1-4, wherein the casing has means (8) for sealing against the cable sheathing.

6. Device according to any of claim 1-5, wherein the casing has means for clamping the cable sheathing for providing a strain relief of the conductors.

7. Device according to any of claim 1-6, wherein the casing, when the plug is enclosed in the casing, is covering an unlocking handle (16) on the plug (2).

8. Electrical connector comprising

a plug (2) having a first end (2a) and a second end (2b), wherein a cable (3) comprising at least one conductor (4) in a cable sheathing (5) is inserted in the first end (2a), leaving a gap between the plug (2) and the cable sheathing (5), and wherein the second end (2b) is to be inserted in a socket in a housing (6) of an electrical appliance, such as an electrical actuator, for establishing an electrical connection between the appliance and the cable conductors,
and a casing (1) comprising two shells (1a, 1b) with means (11a, 11b) for tightly locking the shells together along their longitudinal edges,
wherein the casing has an interior form adapted to form-fittingly receive the first end (2a) of the plug (2) and a part of the cable including the adjacent cable sheathing (5), with an opening (7) at each end of the casing (1), wherein the cable (5) is protruding from one end of the casing and the second end of the plug is protruding from the other end of the casing, and
wherein the casing has locking means (13, 14) for permanently mechanically connect the casing and the enclosed plug to the housing (6).

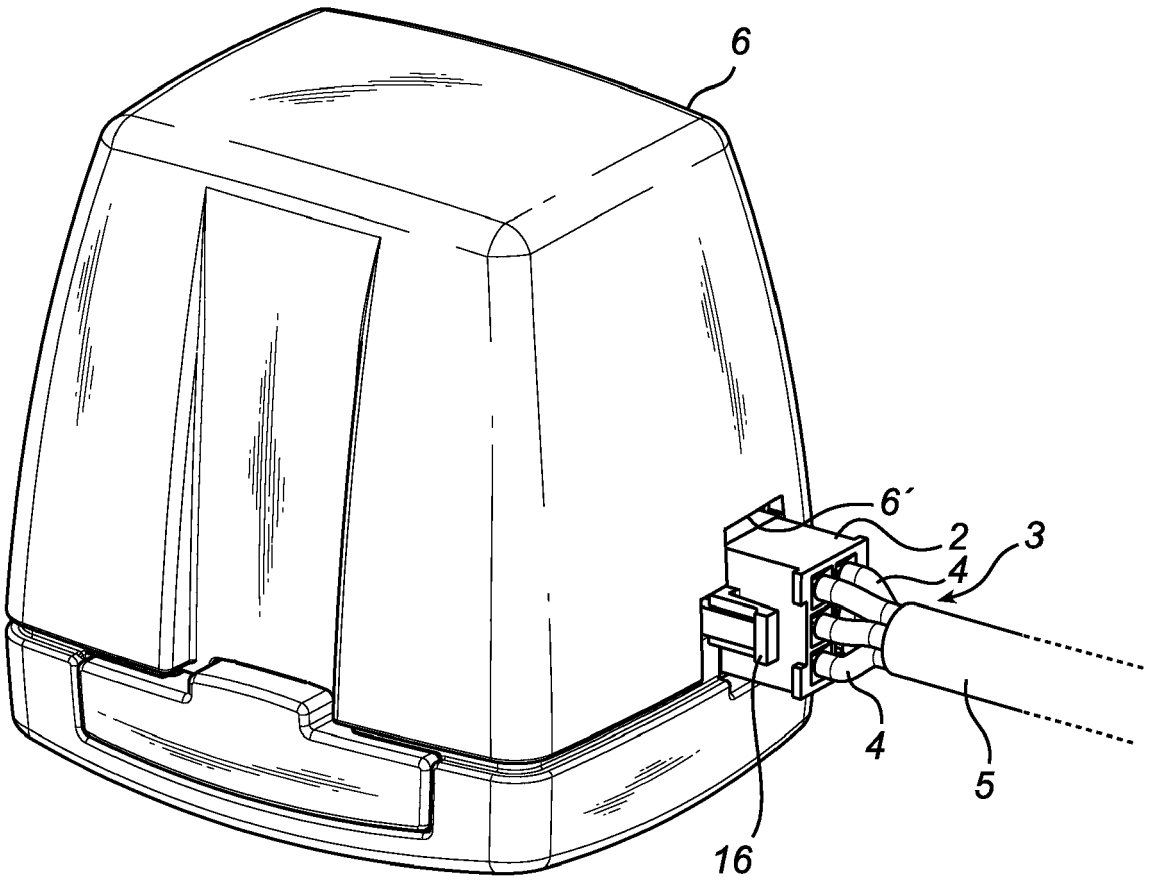

Fig. 1

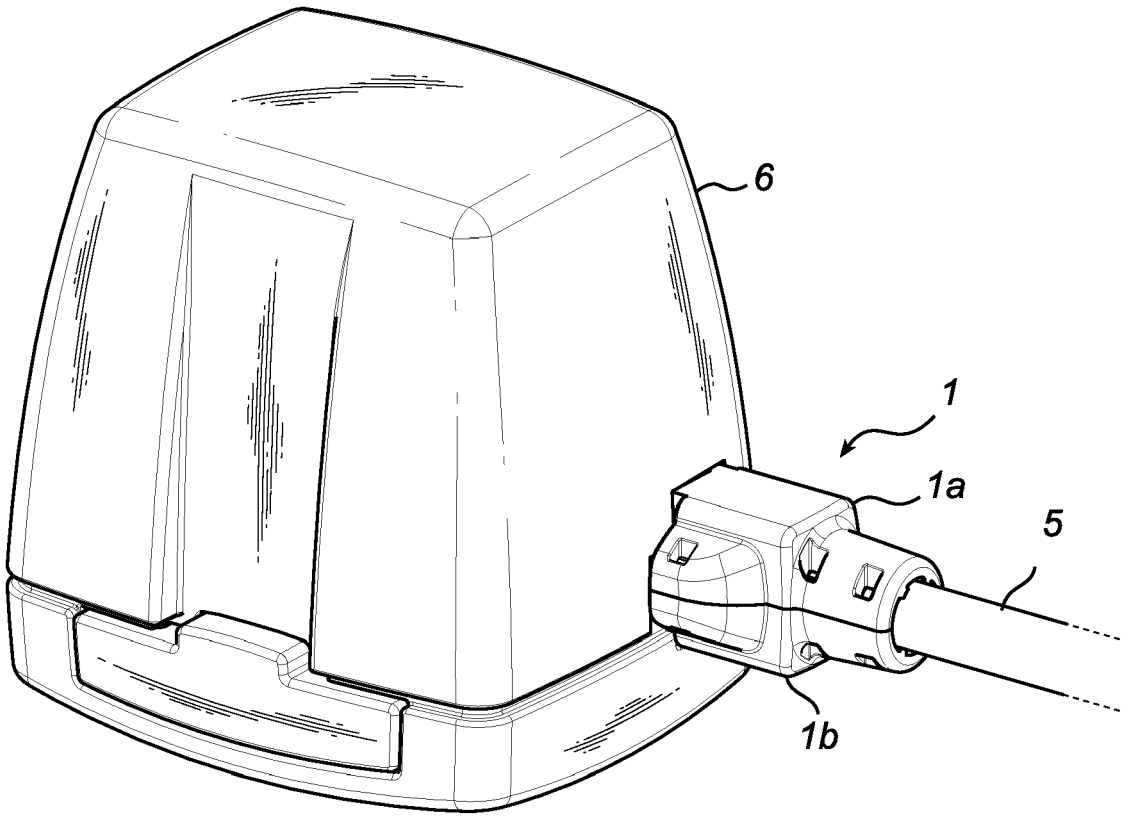

Fig. 2

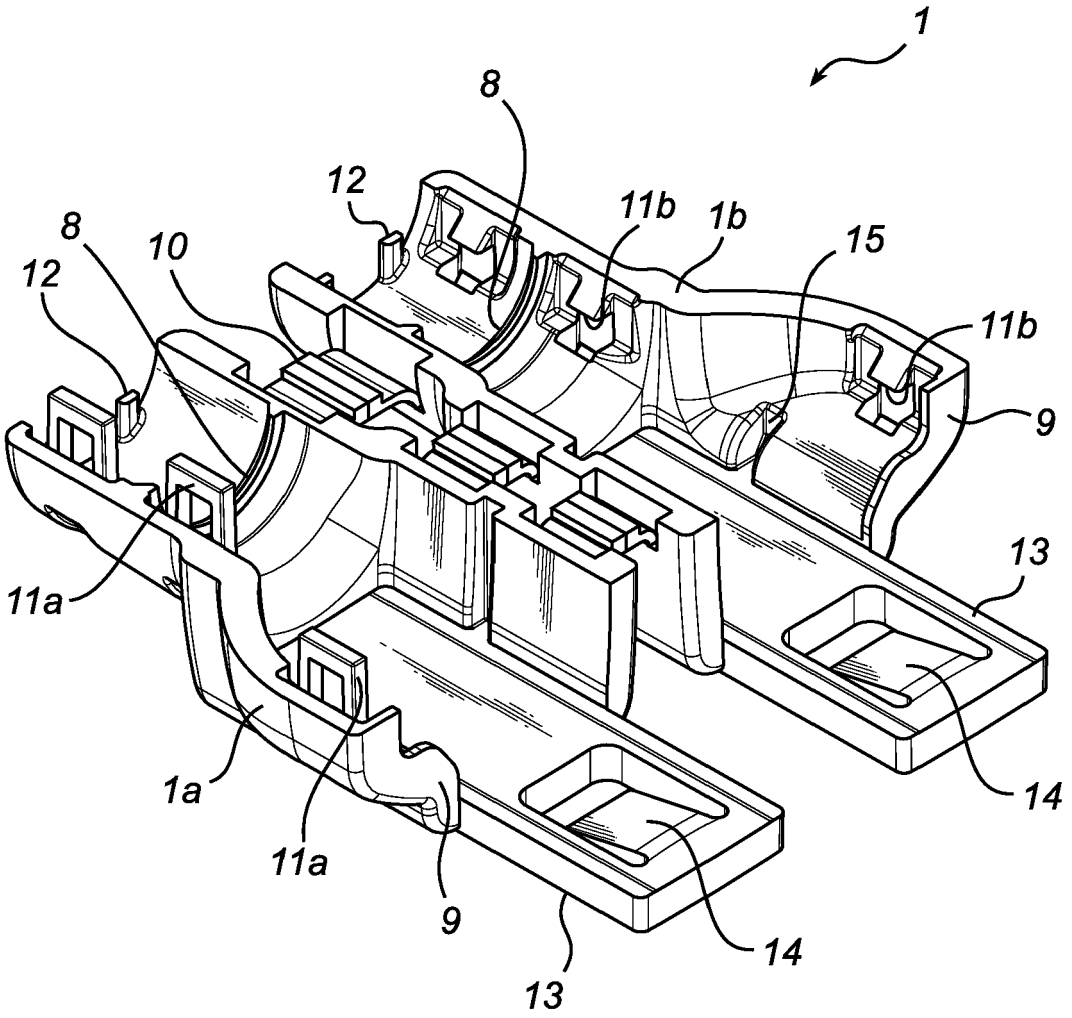

Fig. 3

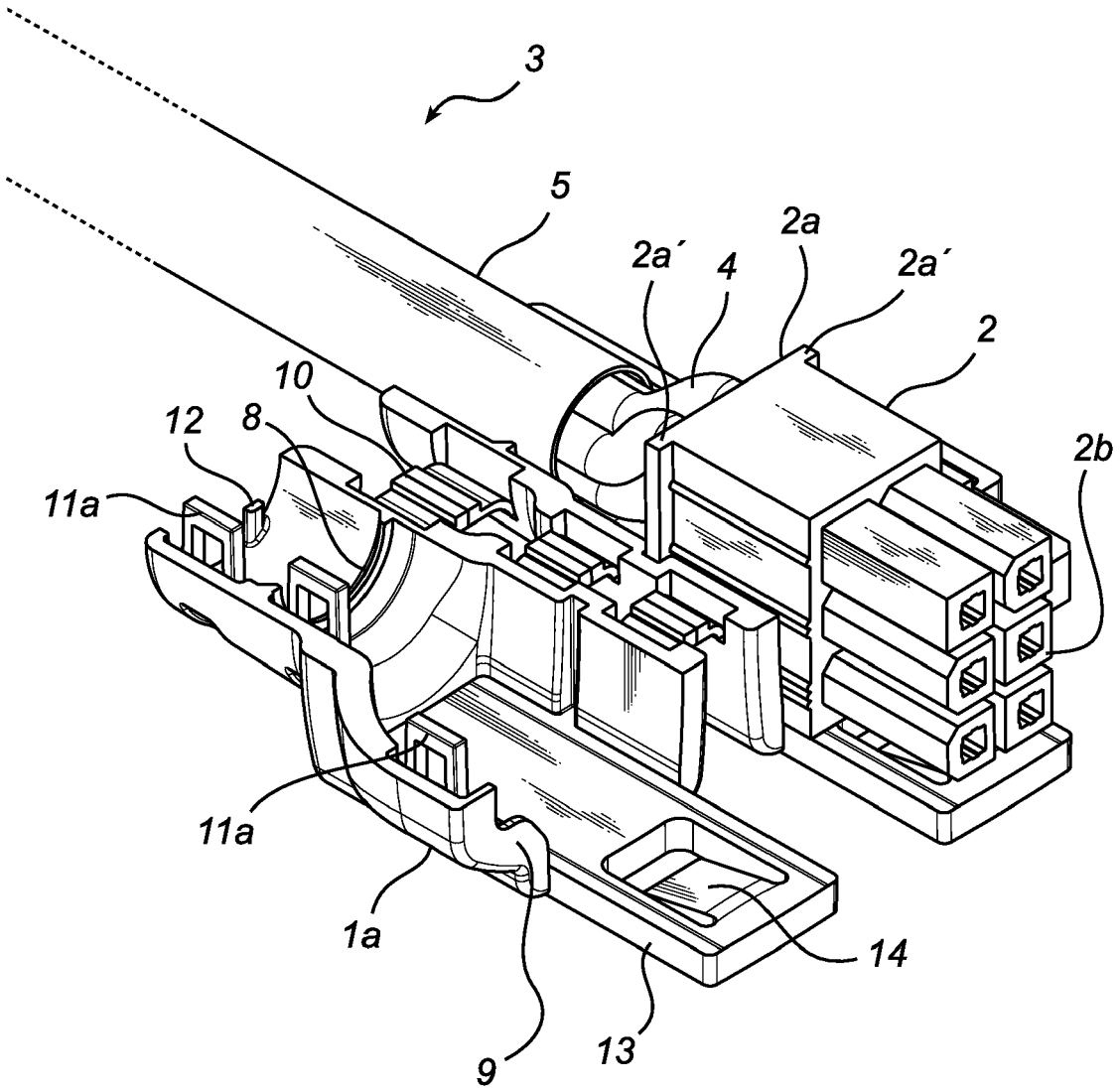

Fig. 4

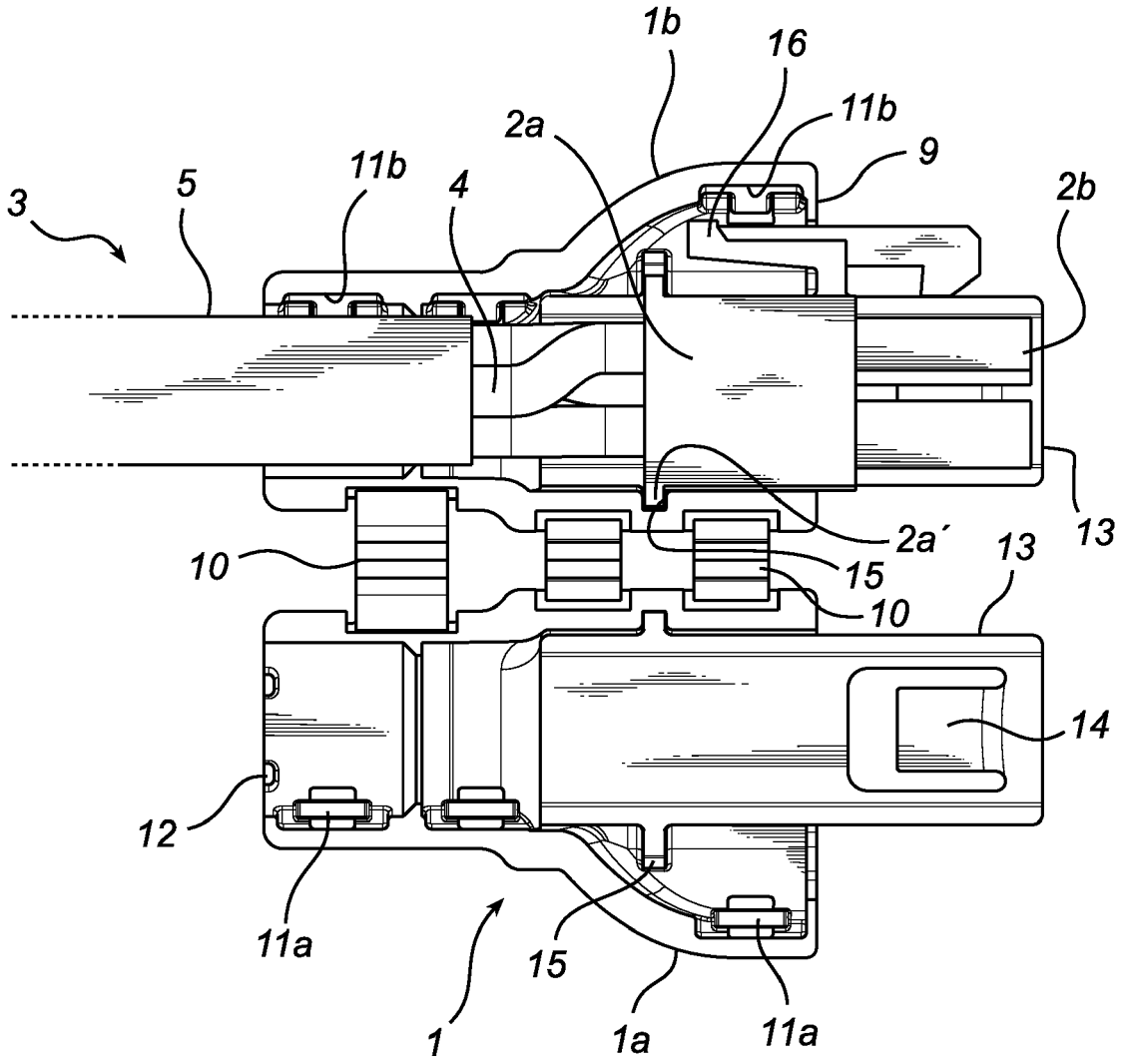

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 3209

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 August 2008	Ledoux, Serge

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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